eClassroom

GCSE Mathematics

AND & OR Rules

Questions

Pearson Edexcel GCSE & iGCSE Mathematics

Section A — Foundation

Worked Examples

[Fluency]

P(A) = 0.3, P(B) = 0.5. A and B are mutually exclusive. Find P(A or B).

Mutually exclusive → P(A or B) = P(A) + P(B)

$$P(A \cup B) = 0.3 + 0.5 = 0.8$$

[Reasoning]

P(A) = 0.6, P(B) = 0.4. A and B are independent. Find P(A and B).

Independent → P(A and B) = P(A) × P(B)

$$P(A \cap B) = 0.6 \times 0.4 = 0.24$$

[Problem Solving]

A card is drawn from a pack. Find P(red or king).

P(red)=26/52, P(king)=4/52, P(red∩king)=2/52

$$P(\text{red} \cup \text{king}) = \frac{26 + 4 - 2}{52} = \frac{28}{52} = \frac{7}{13}$$

[Fluency]

1. P(A) = 0.4 and P(B) = 0.3. A and B are mutually exclusive.
Find P(A or B).

(1 mark)

[Fluency]

2. P(A) = 0.5 and P(B) = 0.2. A and B are independent.
Find P(A and B).

(1 mark)

[Fluency]

3. A card is drawn at random from a standard pack of 52 cards.
Find P(red or king). Show all working.

(3 marks)

[Fluency]

4. P(A) = 0.6 and P(B) = 0.35. P(A and B) = 0.21.
Show that A and B are independent.

(2 marks)

[Fluency]

5. Two events A and B are mutually exclusive.

P(A) = 1/5 and P(B) = 2/5.

Find P(A or B).

(1 mark)

[Reasoning]

6. P(A) = 0.7 and P(B) = 0.4. A and B are independent.

(a) Find P(A and B). (1)

(b) Find P(A or B). (2)

(3 marks)

[Reasoning]

7. P(A∪B) = 0.8, P(A) = 0.5, P(B) = 0.4.

(a) Find P(A∩B). (2)

(b) Are A and B independent? Show your working. (2)

(4 marks)

[Reasoning]

8. A fair die is rolled twice. Find P(both results are even).

(2 marks)

[Problem Solving]

9. P(rain on Monday) = 0.4. P(rain on Tuesday) = 0.3.

Assuming independence, find P(it rains on both days).

(2 marks)

[Problem Solving]

10. P(A) = 0.45, P(B) = 0.3, P(A∩B) = 0.15.

Find:

(a) P(A∪B) **(b)** P(A only) **(c)** P(B only)

(3 marks)

Section B — Higher

Worked Examples

[Fluency]

P(A) = 0.55, P(B) = 0.4, P(A∩B) = 0.2. Find P(A∪B).

$$P(A \cup B) = P(A) + P(B) - P(A \cap B) = 0.55 + 0.40 - 0.20 = 0.75$$

[Reasoning]

Show that for mutually exclusive events, P(A∪B) = P(A) + P(B) is a special case of the general addition rule.

General rule: P(A∪B)=P(A)+P(B)−P(A∩B)

If mutually exclusive: P(A∩B)=0, so P(A∪B)=P(A)+P(B). ✓

[Problem Solving]

P(A) = p, P(B) = q, A and B independent. Show P(A∪B) = 1−(1−p)(1−q).

$$P(A \cup B) = p + q - pq = 1 - (1 - p - q + pq) = 1 - (1 - p)(1 - q) \checkmark$$

[Fluency]

1. P(A) = 0.55, P(B) = 0.4, P(A∩B) = 0.2.

Find P(A∪B).

(2 marks)

[Fluency]

2. P(A∪B) = 0.7, P(A) = 0.4, P(B) = 0.5.

Find P(A∩B).

(2 marks)

[Fluency]

3.

P(A) = 3/8, P(B) = 1/4, P(A∩B) = 1/8.

Find P(A∪B).

(2 marks)

[Reasoning]

4. P(A) = 0.6, P(B) = 0.5, P(A∪B) = 0.8.

(a) Find P(A∩B). (2)

(b) Are A and B independent? Show your working. (2)

(4 marks)

[Reasoning]

5. Show, using the general addition rule, that for mutually exclusive events $P(A \cup B) = P(A) + P(B)$.

(2 marks)

[Reasoning]

6. $P(A) = 0.3$, $P(B) = 0.4$, $P(A \cup B) = 0.58$.

(a) Find $P(A \cap B)$. (2)

(b) Comment on whether A and B are independent. (1)

(3 marks)

[Problem Solving]

7. A and B are independent events with $P(A) = p$ and $P(B) = q$.

Show that $P(A \cup B) = 1 - (1-p)(1-q)$.

Hence find $P(A \cup B)$ when $p = 0.3$ and $q = 0.4$.

(4 marks)

[Problem Solving]

8. Three independent events A, B and C have $P(A) = 0.3$, $P(B) = 0.4$, $P(C) = 0.5$.

Find P(A and B and C).

(2 marks)

[Problem Solving]

9. $P(A \cap B) = 0.12$, $P(A) = 0.4$.

(a) Find $P(B|A)$. (2)

(b) If $P(B) = 0.3$, are A and B independent? (2)

(4 marks)

[Problem Solving]

10. $P(A \cup B) = 4/5$, $P(A \cap B) = 1/10$, and $P(A) = P(B)$.

Find $P(A)$.

(3 marks)